

REMARKS

Claims 1-13 are pending in the application, with Claims 1 and 7 being the independent claims. Claims 1 and 7 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Dent (U.S. Patent No. 5,894,473) in view of Vihriala (U.S. Patent Application Publication No. 2002/0045433 A1) and newly cited Nangia (U.S. Patent No. 7,139,237 B2). Claims 2-6 and 8-13 remain objected to as being dependent upon a rejected base claim but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The Examiner again concedes that Dent does not disclose calculating a frequency offset of the input signal and compensating for that frequency offset, relies on Vihriala for this deficiency, and asserts that it would have been obvious to combine the method and apparatus of Vihriala into the receiver of Dent. The Examiner also concedes that the combination of Dent and Vihriala does not disclose applying the method and apparatus to an IFDMA communication system. The Examiner relies on Nangia for this deficiency, and asserts that it would have been obvious to modify the combination of Dent and Vihriala with the alleged suggestions of Nangia.

Claim 1 recites, in part, estimating multiple access interferences representing an extent to which reception signals for i^{th} other users ($1 \leq i \leq U-1$) at the same time interfere with the reception signal for the u^{th} user.

Dent describes a multiple access communication system and method using code and time division, and Vihriala describes a method and arrangement for reducing frequency offset in a radio receiver. Nangia describes a method and system for multirate multiuser modulation.

Dent generally describes coding information signals with CDMA codewords to be transmitted over a common frequency spectrum, time compressing the CDMA codewords

for transmission only during allocated timeslots, activating a receiver only during the allocated timeslots to receive and decompress the time compressed CDMA codewords, and decoding the decompressed CDMA codewords to recover the information signals. Dent nowhere suggests estimating multiple access interferences representing an extent to which reception signals for i^{th} other users ($1 \leq i \leq U-1$) at the same time interfere with the reception signal for the u^{th} user.

Vihriala generally describes receivers where a channel estimator is used for correcting the base band signal. Vihriala monitors the phase of the channel estimation output and generates a complex phasor on the basis of successive phase values. The received baseband signal is then multiplied by the generated complex phasor for compensating the frequency offset. The frequency compensation can be made before or after the channel estimation thus producing a feedback compensation or feedforward compensation. The feedback compensation can be implemented by compensating the baseband signal either prior to the despreading or after the despreading. Vihriala nowhere suggests estimating multiple access interferences representing an extent to which reception signals for i^{th} other users ($1 \leq i \leq U-1$) at the same time interfere with the reception signal for the u^{th} user.

Nangia generally describes a multi-rate OFDMA modulation scheme that permits users to transmit at different rates or vary their data rates while providing frequency diversity and preserving low peak-to-average power ratios and orthogonality between users at different data rates. The modulation scheme allows user-specific data block and repetition sizes, as well as user-specific modulation codes. Code assignment rules are provided for maintaining orthogonality between users having different data rates. Block and phase ramp modulation codes can be used. Asynchronous transmissions by users are supported by ensuring that the length of the cyclic extension is sufficiently long to tolerate worst case relative signal arrival delays between users and the channel pulse response duration over the communication medium. The modulation scheme can be used in wireless communication systems. Nangia nowhere suggests estimating multiple access

interferences representing an extent to which reception signals for i^{th} other users ($1 \leq i \leq U-1$) at the same time interfere with the reception signal for the u^{th} user.

In contrast, the present invention relates to compensating for a frequency offset between a transmission signal and a reception signal for a user in an IFDMA system. The present invention estimates the frequency offset from a selection signal, estimates multiple access interferences, and subtracts the estimated multiple access interferences.

The Examiner has shown no areas of Dent, Vihriala, or Nangia, that even discuss estimating multiple access interferences representing an extent to which reception signals for i^{th} other users ($1 \leq i \leq U-1$) at the same time interfere with the reception signal for the u^{th} user.

More particularly, Dent, Vihriala, Nangia, or any combination thereof, fails to teach or reasonably suggest a method and apparatus for compensating for a frequency offset between a transmission signal and a reception signal for a u^{th} user ($1 \leq u \leq U$, where U denotes the number of users) in an IFDMA system, where the method includes the steps of: (a) estimating the frequency offset from a selection signal in the IFDMA system that is determined as the reception signal for the u^{th} user in an initial mode and as a feedback signal in a normal mode; (b) estimating multiple access interferences representing an extent to which reception signals for i^{th} other users ($1 \leq i \leq U-1$) at the same time interfere with the reception signal for the u^{th} user; (c) subtracting the estimated multiple access interferences from the reception signal for the u^{th} user and determining the subtraction result as the feedback signal; (d) determining whether steps (a), (b), and (c) have been repeated a predetermined number of times, and if it is determined that steps (a), (b), and (c) have not been repeated the predetermined number of times, going back to step (a); and (e) if it is determined that steps (a), (b), and (c) have been repeated the predetermined number of times, estimating the transmission signal for the u^{th} user using the feedback signal finally determined in step (c) and the estimated frequency offset, as

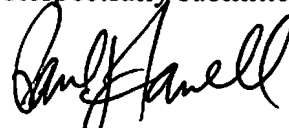
recited in Claim 1. Dent, Vihriala, Nangia, or any combination thereof, fails to teach or reasonably suggest an apparatus with similar recitations in Claim 7.

Accordingly, Claims 1 and 7 are allowable over Dent, Vihriala, Nangia, or any combination thereof.

While not conceding the patentability of the dependent claims, *per se*, Claims 2-6 and 8-13 are also allowable for at least the above reasons.

Accordingly, all of the claims pending in the Application, namely, Claims 1-13, are in condition for allowance. Should the Examiner believe that a telephone conference or personal interview would facilitate resolution of any remaining matters, the Examiner may contact Applicants' attorney at the number given below.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Paul J. Farrell", is written over the typed name.

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